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IS 11654-3-403 (1989): Flexible insulating sleeving, Part 3: Specifications for individual type of sleeving, Section 403: Glass textile sleeving coated with acrylic based coating high breakdown strength [ETD 2: Solid Electrical Insulating Materials and Insulation Systems]



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IS 11654 (Part 3/Sec 403) : 1989

(Reaffirmed 2000)

Edition 1.1

(1993-04)

Indian Standard

SPECIFICATION FOR FLEXIBLE INSULATING SLEEVING

PART 3 SPECIFICATIONS FOR INDIVIDUAL TYPES OF SLEEVINGS

**Section 403 Glass Textile Sleaving with Acrylic Based Coating — High
Breakdown Strength**

भारतीय मानक

नम्य विद्युत्तरोधन स्लीविंग

भाग 3 अलग-अलग स्लीविंग

अनुभाग 403 उच्च भंजन सामर्थ्य वाली एक्रिलिक आधारित लेपनयुक्त काँच-वस्त्रादि की स्लीविंग

(Incorporating Amendment No. 1)

UDC 621.315.614.72-462

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FOREWORD

This Indian Standard (Part 3/Sec 403) was adopted by the Bureau of Indian Standards on 20 December 1989, after the draft finalized by the Solid Electrical Insulating Materials Sectional Committee had been approved by the Electrotechnical Division Council.

This standard deals with flexible insulating sleeveings. It consists of the following three parts:

Part 1 Definitions and general requirements,

Part 2 Methods of tests, and

Part 3 Specifications for individual types of sleeving.

This standard (Part 3/Sec 403) covers the requirements for glass textile sleeving coated with acrylic resin, high breakdown strength.

This standard should be read in conjunction with IS 11654 (Part 1) : 1986 'Specification for flexible insulating sleeving: Part 1 Definitions and general requirements' and IS 11654 (Part 2) : 1986 'Specification for flexible insulating sleeving: Part 2 Methods of tests'.

In the preparation of this standard, assistance has been derived from IEC Doc 15C (C.O) 200, Sheet 403 Glass textile sleeving coated with acrylic based coating high breakdown strength, issued by the International Electrotechnical Commission (IEC).

This edition 1.1 incorporates Amendment No. 1 (April 1993). Side bar indicates modification of the text as the result of incorporation of the amendment.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

SPECIFICATION FOR FLEXIBLE INSULATING SLEEVING

PART 3 SPECIFICATIONS FOR INDIVIDUAL TYPES OF SLEEVINGS

Section 403 Glass Textile Sleeving with Acrylic Based Coating — High Breakdown Strength

1 SCOPE

1.1 This standard (Part 3/Sec 403) covers the requirements for 'E' type glass sleeveings using either braided or knitted construction with a continuous acrylic based coating of high breakdown strength, temperature index 155.

2 REFERENCES

2.1 The following Indian Standards are necessary adjuncts to this standard:

<i>IS No.</i>	<i>Title</i>
11654 (Part 1) : 1986	Specification for flexible insulating sleeving: Part 1 Definitions and general requirements
11654 (Part 2) : 1986	Specification for flexible insulating sleeving: Part 2 Methods of tests
8504 (Part 1) : 1977	Guide for determination of thermal endurance properties of electrical insulating material: Part 1 Temperature indices and thermal endurance properties

3 DESIGNATION

3.1 Sleeving covered in this standard shall be identified as given in **3.1** of IS 11654 (Part 1) : 1986. For example IS 11654-3-403 Nominal bore size in mm with suffix ('B' indicates bilateral and 'U' indicates unilateral tolerance) indicating type of tolerance — Colour Code (*see* Note 2).

NOTES

1 In those cases where the designation is required to differentiate between sleeving which is braided and sleeving which is knitted the designation may be worded with suffix as braided or knitted.

2 Colour Code shall be as indicated in **3.2** of IS 11654 (Part 1) : 1986.

For Example:

IS 11654-3-403 Nominal bore size in mm — with suffix indicating type of tolerance — colour — braided or knitted.

4 COLOUR AND BORE SIZES

4.1 The sleeving is normally available in bore sizes 0.3 mm to 25 mm and in the following colours:

Black, white, red, yellow, blue, brown, green/yellow and natural.

5 REQUIREMENTS

5.1 In addition to the general requirements given in IS 11654 (Part 1) : 1986, requirements specified in this standard shall also be applicable.

5.2 Dimensions

The sleeving shall comply with the dimensional requirements given in Table 1.

5.3 Bending After Heating

When tested in accordance with **13** of IS 11654 (Part 2) : 1986 there shall be no cracking or detachment of coating, and the original colour shall be clearly recognisable after testing at temperature $180 \pm 3^\circ\text{C}$ and mandrel diameters given in Table 2.

5.4 Bending at Low Temperature

When tested in accordance with **14** of IS 11654 (Part 2) : 1986 there shall be no cracking or detachment of coating visible after bending around mandrels shown in Table 2 while at temperature not above -15°C .

5.5 Resistance to Soldering Heat

When tested in accordance with **7** of IS 11654 (Part 2) : 1986 the sleeving shall not show sign of splitting.

NOTE — This test is applicable for sleeving having nominal bore dia up to and including 5 mm.

5.6 Hydrolysis of Coating

When tested in accordance with **17** of IS 11654 (Part 2) : 1986, there shall be no running off the coating, adherence between sleeving and paper, between the pieces of sleeving or any sign of discolouration of the paper.

5.7 Thermal Endurance (TI)

When tested in accordance with IS 8504 (Part 1) : 1977 TI at 20 000 hours shall be 155 minimum.

Table 1 Dimensional Requirements
(Clause 5.2)

Nominal Bore mm	Tolerance on Bore Dia, mm		Wall Thickness, mm	
	Bilateral (\pm)	Unilateral (+)	Min	Max
(1)	(2)	(3)	(4)	(5)
0.3	0.10	0.20	0.25	0.50
0.5	0.10	0.20	0.25	0.50
0.8	0.10	0.20	0.25	0.50
1.0	0.15	0.30	0.25	0.75
1.5	0.15	0.30	0.35	0.75
2.0	0.20	0.40	0.35	0.75
2.5	0.20	0.40	0.40	0.75
3.0	0.25	0.50	0.40	0.75
4.0	0.25	0.50	0.50	0.75
5.0	0.25	0.50	0.50	0.75
6.0	0.25	0.50	0.50	0.75
8.0	0.25	1.00	0.50	0.75
10.0	0.50	1.00	0.65	1.00
12.0	0.50	1.00	0.65	1.00
16.0	0.50	1.00	0.65	1.00
20.0	0.50	1.00	0.65	1.20
25.0	0.50	1.00	0.65	1.20

| Note deleted

**Table 2 Mandrel Diameters for
Bending Test**
(Clauses 5.3 and 5.4)

Nominal Bore Dia mm	Mandrel Diameters, mm	
	After Heating	At Low Temperatures
(1)	(2)	(3)
0.5	3	3
0.8	4	4
1.0	5	5
1.5	6	6
2.0	8	8
2.5	10	10
3.0	12	12
4.0	15	15
5.0	18	18
6.0	21	21
8.0	27	27
10.0	33	6
12.0	40	6
16.0	6	6
20.0	6	6
25.0	6	6

5.8 Flammability

When tested in accordance with IS 11654 (Part 2) : 1986 the sleeving shall meet requirement of 60 seconds (maximum). In addition, the indicator flag on test shall not be burned nor shall flaming or glowing particles ignite the cotton.

5.9 Insulation Resistance

When tested in accordance with **22.4.2** of IS 11654 (Part 2) : 1986 the insulation resistance shall be 10^3 M Ω (minimum).

5.10 Breakdown Voltage

5.10.1 Breakdown voltage shall be determined by any of shot bath tests given in **21.2** and straight mandrel test, 25 mm electrode given in **21.2** of IS 11654 (Part 2) : 1986.

5.10.2 The rate of voltage application shall be 500 V/seconds or such that the required breakdown value is reached between 10 and 20 seconds.

5.10.3 The requirements of breakdown voltage at room temperature, elevated temperature and damp heat when measured in accordance

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with **21.7** of IS 11654 (Part 2) : 1986 shall be as given in Table 3.

6 PACKAGING

6.1 Provisions given in **9.1** of IS 11654 (Part 1) : 1986 shall apply.

7 MARKING

7.1 In addition to the details given in **10** of IS 11654 (Part 1) : 1986 following information shall be labelled:

Construction of the sleeving — braided or knitted.

Table 3 Requirements for Breakdown Voltage

(Clause 5.10.3)

	Shot Bath Test Using Straight Mandrel 250 mm Electrode		Straight Mandrel with 25 mm Electrode	
	Central Value (kV)	Lowest Individual Value (kV)	Central Value (kV)	Lowest Individual Value (kV)
Breakdown voltage, kV (<i>Min</i>) :				
a) At room temperature	5.0	4.0	7.0	5.0
b) Elevated temperature (130°C)	3.0	2.5	2.8	2.0
c) After damp heat	1.5	1.2	2.0	1.5

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